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INSTRUCTION MANUAL
For
FM SIGNAL GENERATOR

MODEL 201B

SIERRA ELECTRONIC CORPORATION

division of PHILCO CORPORATION
MENLO PARK, CALIFORNIA, U. S. A.

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Manufactured by

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ILLUSTRATIONS

FIGURE

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INSTRUCTION MANUAL
FOR
FM SIGNAL GENERATOR, MODEL 201B

1. SPECIFICATIONS AND GENERAL DESCRIPTION

1.1 Frequency

1.1.1 Range 1300 - 2500 Mc

1.1.2 Tuning Single knob tuning, direct reading dial, no mode shifting.

1.1.3 Stability

After warm-up the frequency drift or shift does not exceed 5 KC per minute, 100 KC in 20 minutes, or 2 MC in 10 hours, assuming the ambient temperature changes less than 10°C.

1.2 RF Output

1.2.1 Power

0 to -110 dbm adjustable through a precision attenuator. Attenuation error does not exceed ± 3 db from 0 to 20 dbm, or ± 1.5 db from -20 to -60 dbm, or ± 1 db from -60 to -90 dbm, or ± 3 db from -90 to -110 dbm.

1.2.2 Connection

Front panel type N-50 ohm female jack; VSWR 1.6

1.3 Auxiliary Output

1.3.1 Power

0 to -5 dbm, not adjustable; isolation from RF output more than 30 db.

1.3.2 Connection

Front panel, Type N-50 ohm, female jack; VSWR 1.3.

1.4 Power Monitor

2-1/2" zero center meter; the attenuator dial is direct reading in dbm when the power monitor is set to standard output.

1.5 Modulation

1.5.1 CW

The generator gives CW signals with spurious FM hum and noise of less than 10KC peak to peak.

1.5.2 FM

The generator can be frequency modulated with a signal applied to the Modulation Input connector (Type BNC, 600 ohm). Deviation is linear within 1% to 2 Mc peak-to-peak deviation and within 2% to 3.0 Mc peak-to-peak deviation; half-power points are 6 MC peak-to-peak or more. Modulation amplifier response is flat to +0 db or -3 db from 100 c/s to 500 KC. 2.6 Mc peak-to-peak deviation can be achieved at any RF frequency with 0.5V peak-to-peak input signal; Modulation Adjust dial calibration is valid with 1.0V peak-to-peak input signal.

1.5.3 AM Square Wave

The generator can be 100% AM modulated with a square wave from an internal source. The square wave frequency is adjustable from 800 to 1200 c/s.

1.6 AC Power Input

117V $\pm$ 10%, 47-63, single phase 200W.

1.7 Operating Ambient Temperature

-20°C to + 54°C.

1.8 Size And Weight

Front panel 19" X 15-3/4" for mounting in standard 19" rack. Depth 16".

1.9 General Description

1.9.1 The Sierra Model 201B FM Signal Generator, N.B. is a microwave signal generator designed with special emphasis on wide tuning range and excellent FM characteristics for use in narrow band applications.

- 1.9.2 It uses a reflex klystron in an external cavity as RF oscillator and delivers its main output through a calibrated piston attenuator of high precision and good linearity, even at the maximum rated output power of 1 MW (0 dbm).
- 1.9.3 An auxiliary output for connection to an external frequency meter is provided through a simple loop coupling and an attenuator.

2. INSTALLATION AND OPERATION

2.1 Installation

The generator is designed for mounting in a standard 19" rack and requires a height of 15-3/4".

The AC power input cable is located in the rear, in the lower right-hand corner as seen from the rear; this cable is about 2' long and is terminated in a single phase, three prong plug.

All other connections and all operating controls are on the front panel.

2.2 CW Operation

2.2.1 The generator should be turned on and allowed to warm-up for at least 30 minutes.

2.2.2 The generator is tuned to the desired frequency as indicated on the Frequency dial which is direct reading in MC. Small changes in frequency can be made with the Frequency Fine control.

In order to tune to a particular frequency with high precision an external frequency meter or transfer oscillator-counter combination should be connected to the Auxiliary Output connector.

CAUTION: DO NOT APPLY POWER IN EXCESS OF 500 MW TO AUXILIARY OUTPUT.

2.2.3 The output power is normalized by first balancing the power monitor with the Zero Set control while the Modulation Selector is in the OFF position, then switch to CW position and rebalance the power monitor with the Power Set control. The Attenuator dial is now direct reading in dbm from 0 dbm (1mW) to -110 dbm delivered to a matched 50 ohm load at the RF Output connector.

**CAUTION: DO NOT APPLY DC VOLTAGE NOR RF POWER IN
EXCESS OF 50 MW TO RF OUTPUT.**

This procedure should be repeated after each change in frequency to assure correct output power.

2.3 FM Operation

2.3.1 The generator is allowed to warm up and is then tuned as for CW operation (2.2.1 and 2.2.2).

2.3.2 The signal with which it is desired to modulate the generator is applied to the Modulation Input connector, the Modulation Selector is set to the FM position and the frequency deviation is adjusted to a suitable value with the Modulation Adjust control. This control is directly calibrated in peak-to-peak deviation in MC if the voltage applied to the Modulation input connector is 1 V p-p.

CAUTION: MAX. VOLTAGE 20 V p-p OR 20VDC.

The frequency response of the modulation amplifier is flat within +0 or -3 db from 100 c/s to 500 kc.

2.3.3 Normalize power as for CW operation (2.2.3) except set Modulation Selector to FM while rebalancing with Power Set Control. Note: With large frequency deviation there is a small difference in average power between CW and FM operation.

2.4 AM (Square Wave) Operation

2.4.1 The generator is allowed to warm up and is then tuned as for CW operation (2.2.1 and 2.2.2).

2.4.2 The modulation selector is set to Square Wave and the Square Wave Frequency adjusted as required.

2.4.3 Normalize power as for CW operation (2.2.3) except set Modulation Selector to Square Wave while rebalancing with Power Set control. Note: The average power, as shown on power monitor, is about 3 db less with square wave modulation than with CW. At RF frequencies below 1700 Mc it may not be possible to rebalance the power monitor with the Power Set control when the Modulation Selector is in the Square Wave position.

3. THEORY OF OPERATION

Refer to Schematic Diagram Fig. 9.

3.1 RF Oscillator

3.1.1 The reflex klystron V301 (6BM6) is mounted in a re-entrant cavity and operates in the $3/4$ wave cavity mode and the $2-3/4$ repeller mode. The cavity is mechanically tuned with a contacting piston, and unwanted modes are suppressed by a dielectric ring mounted on the piston. See exploded view Figure 3.

3.1.2 The repeller voltage is taken from the top of potentiometer R317 which is mechanically coupled with the cavity tuning in such a way that good tracking is achieved through the tuning range. Diodes CR302 and CR303 protect the repeller from becoming more positive than the cathode.

When the Modulation Selector switch S2 is in the OFF position (Pos. 2) a high negative voltage is applied to the control grid of V301 to reduce the beam current to a point where oscillation cannot occur.

NOTE: Beam and repeller voltages are still present on the klystron.

3.1.3 A coupling loop on the tuning piston couples RF power from the cavity through an attenuator to the Auxiliary Output. At the same time this provides a loading of the cavity which has been selected for the best frequency modulation characteristic.

3.1.4 Two identical waveguides-beyond-cutoff are coupled to opposite sides of the oscillator and a piston with a pick-up loop is mounted in each of these waveguides. The power picked up by one of the loops is connected directly to the RF Output connector; it is terminated in a 56 ohm resistor R325. The power picked up by the other loop is dissipated in the thermistor R324 through the distributed capacitance between the front plate and the body of the piston.

3.1.5 The thermistor R324 is one branch of a balanced bridge, the other branches of which are R305, R306 and R311, the bridge balance is indicated by the meter M301. When the Modulation Selector switch is in position OFF (Pos. 2) no RF power is delivered to thermistor R324 but a small amount of 1 kc power is applied from the multi-vibrator V203 through cathode follower V204 and resistors R309 and

R312; the bridge can now be balanced with the Zero Set control R308 and then the 1 kc power P_1 dissipated in thermistor R324 can be computed from the 1 kc current i_1 through R309 and R312 and the known resistance R_t of the thermistor $R324: P = 1/4 (i_1)^2 R_t$. When the Modulation Selector is in any of the other positions no power is delivered from the multivibrator V203 to thermistor R324 and in order to rebalance the bridge an amount of RF power equal to P_1 must be dissipated in the thermistor.

The network consisting of resistors R302, R303, R304 and thermistor R301 provide temperature compensation for the bridge by adjusting the DC current in the bridge; no sensitivity compensation is provided since standard power is indicated by a null reading.

3.2 Modulation Circuits

- 3.2.1 The modulation amplifier V202 receives the modulating signal from the modulation Input connector J3 through the Modulation Adjust potentiometer R202. The amplifier has two RC coupled stages with over-all feed-back through C204 and R211 to stabilize the gain and reduce distortion.

With Modulation Selector switch S2 in FM position (Pos. 4) the output of this amplifier is applied to the repeller of klystron V301.

- 3.2.2 The multivibrator V203 is free running at frequencies from 800 c/s to 1200 c/s as adjusted with the Square Wave Frequency control R215. The symmetry of the square wave can be adjusted with potentiometer R218. A cathode follower V204 acts as a buffer for the multivibrator.

With Modulation Selector switch S2 in OFF position the output from the cathode follower is applied as a calibration signal to the power monitor bridge (3.1.5).

With Modulation Selector switch S2 in Square Wave position (Pos. 1), the square wave voltage is applied to the repeller of klystron V301 in such a manner that during one half cycle the repeller voltage is the same as required for CW operation and during the other half cycle the voltage is sufficiently different to prevent oscillation.

With the Modulation Selector switch S2 in the CW or FM position (Pos. 3 and 4), the plate supply voltage is disconnected from V203 to prevent interference from the square wave.

3.3 Power Supplies

- 3.3.1 The AC power input is applied through the main switch S1 and line fuse F101 to the power transformer T101. The network consisting of C101 and R101 is shunted across the primary of transformer T101 to reduce switching transients.
- 3.3.2 The beam voltage for klystron V301, plate supply voltage for V202, V203, and V204 and DC supply voltage for the power monitor is rectified by diodes CR105-109 and CR115-116C filtered by reactor L101 and capacitor C102 and regulated against variations in load or line voltage by the regulator circuit consisting of V101, V102 and V103; this circuit is essentially the same as preferred circuit No. 3A, Handbook of Preferred Circuits, NAVAER 16-1-59, dated 1 September 1955. Fuse F301 protects the klystron V301 against excessive beam current.
- 3.3.3 The repeller voltage for klystron V301 is rectified by diodes CR101-104 and CR110-114 filtered by resistors R108, R115 and capacitors C106, C107, and regulated by the voltage regulator tubes V104, V105 and V106 through dropping resistor R116.
- 3.3.4 The heater voltage for klystron V301 and amplifier V102 is rectified by diodes CR117-CR120 and regulated by Zener diode CR121 through dropping resistor R102.

4. MAINTENANCE

4.1 Preventive Maintenance

Very little preventive maintenance is required to obtain satisfactory performance from the Model 201B FM Signal Generator.

4.2 Adjustment and Calibration

Adjustment and calibration should be performed at regular intervals to assure the best results.

- 4.2.1 Check all DC voltages marked on the schematic diagram using a voltmeter of 20,000 ohms per volt and 2% or better accuracy, e.g. Weston Mod. 980, mark II. These voltages should not change with different settings of S2.

Readjust the beam voltage with potentiometer R120 if necessary.

- 4.2.2 The repeller voltage tracking is set at the factory to provide a minimum distortion of FM modulation throughout the tuning range. It should not be touched unless necessary. The tracking circuit consists of resistors R313 and R314, potentiometers R315 and R316 (screwdriver controls) and potentiometer R317 which is mechanically coupled to the tuning mechanism.

CAUTION: DO NOT ATTEMPT TO READJUST THE TRACKING WITHOUT COMPLETE TEST EQUIPMENT.

The test setup for adjusting the repeller tracking is shown in block diagram Fig. 6. For rough adjustment the Modulation Selector is set to CW (Pos. 3) the generator is tuned to 2400 Mc and R316 is adjusted for a maximum RF output; then the generator is tuned to 1500 Mc and R315 is adjusted for a maximum RF output. These adjustments are repeated until the generator delivers an RF output at any tuning.

For fine adjustment, the Modulation Selector is set to FM (Pos. 4) and the Modulation Adjustment is set to give so much deviation that substantial AM modulation is shown on the oscilloscope; the trace is likely to look like Fig. 7a, indicating a substantial unbalance. The generator is tuned to 1800 Mc and R315 is adjusted for a balanced trace on the oscilloscope similar to Figure 7b, then the generator is tuned to 2250 Mc and R316 is adjusted for a balanced trace. These adjustments are repeated as necessary to provide a nearly balanced trace at any tuning of the generator. Lock the shafts of R315 and R316 and recheck tracking.

Figure 8 gives a graph of cathode-to-repeller voltage vs. frequency. These are typical values and should be used only for reference or as a rough check.

- 4.2.3 Turn Modulation Selector to OFF; check that no RF is generated at any tuning. Use HP Mod. 430C Power Meter and HP Mod. 477B thermistor mount or equivalent.
- 4.2.4 Turn Modulation Selector to OFF. Use an oscilloscope with a frequency response of 2 Mc or more (e.g. H.P. Mod. 150) to view the shape of the square wave on pin 3 and 8 of V204; compare to Fig. 4; adjust for equal length of the two half periods with potentiometer R218; measure maximum and minimum square wave frequency as adjusted with Square Wave Frequency control R215.

- 4.2.5 To check output attenuator and power monitor adjustment use a power meter e.g. H.P. Mod. 430C, and thermistor mount, e.g. H.P. Mod. 477B to measure power at RF Output. If necessary to readjust tune to 1800 Mc, use attenuator to adjust the actual power out to -5 dbm, use Power Set to place indicator line over 5 db mark, use Zero Set to balance power monitor; then turn Modulation Selector to OFF and rebalance the power monitor; with potentiometer R312. The AC voltage measured with an average reading, RMS calibrated VTVM across R305 should now be approximately .32V and the wave shape should be similar to Figure 5. Use H.P. Mod. 400H Voltmeter and H.P. Mod. 150A Oscilloscope or equivalent.
- 4.2.6 Turn Modulation Selector to CW. Use an external frequency meter, e.g. FXR Mod. N410A Cavity Wavemeter or H.P. Mod. 540A transfer oscillator to check the frequency dial at several points through the tuning range.

4.3 Fault Location And Correction

- 4.3.1 Some common symptoms and possible faults are listed in Table 1.

TABLE 1
TROUBLE SHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CHECK OR CORRECT
Instrument dead Pilot light off	Blown Fuse	Replace fuse F101. If fuse blows again find cause.
Instrument dead Pilot light on	a-Defective Series tube b-Defective Rectifier (unlikely)	Replace V101. Check voltage across C101; if zero volts find and replace defective diode(s).
No RF output with Modulation Selector in any position	a-Blown fuse b-Defective klystron c-Incorrect supply voltage	Replace F301. If it blows again find cause(see below). Replace fuse F301 with 0-50 mA meter to check beam current. Check heater voltage, beam voltage and repeller voltage.

SYMPTOM	POSSIBLE CAUSE	CHECK OR CORRECT
Fuse F301 keeps blowing	a-Defective klystron	Use ohmmeter to check for short from cathode to ground.
	b-Defective wiring	Remove socket from klystron (see 4.3.3.1) and check for shorts
	c-Excessive beam voltage	Measure voltage across C110. Reset with R120 if possible, otherwise see below.
Beam voltage can not be adjusted to -325V with R120	Defective tube	Replace V101, V102, and V103, one at a time.
Power Monitor will zero set (2.23) but not rebalance with Power Set control	Defective tube V203 or V204	Turn Modulation Selector to Square Wave; if V203 or V204 is defective RF output will be CW
Power Monitor pinned on stop regardless of zero set adjustment	Defective thermistor R324	Disconnect wire leading to R 324 and check for open or short. Normal resistance at 25°C temperature is 2000 ohm, higher at lower temperature.
High distortion of frequency modulation with small or medium deviation.	a-Defective tube V201 or V202	Check gain and distortion, replace tube.
	b-Faulty repeller tracking	Adjust repeller tracking. Do not attempt this correction without complete equipment. See Sect. 4.2.2.

4.3.2 Tube Replacement

All circuits are designed to accept any good tube of the proper type, but in most cases certain readjustments are required after tube replacement; these are:

- 4.3.2.1 V103 Voltage regulator or V102 amplifier; readjust potentiometer R120 for proper beam voltage (see 4.3.1).
- 4.3.2.2 V104, V105 or V106 voltage regulator; readjust repeller tracking if required. Do not attempt this correction without complete equipment. See Sect. 4.2.2.

- 4.3.2.3 V202 multivibrator; readjust symmetry with potentiometer R218 (see 4.2.4).

4.3.3 Klystron Replacement

- 4.3.3.1 The RF oscillator klystron V301 is completely enclosed in the cavity and the klystron cover, See Fig. 2, and Fig. 3.

To remove the klystron first loosen the four screws that hold the klystron cover and slide the cover back along the supply wires; gently pull the socket off the klystron, unscrew the large klystron retainer nut and remove the washer and O-ring. The klystron can now be pulled straight out of the cavity.

CAUTION: DO NOT TWIST, TURN OR BEND THE KLYSTRON

- 4.3.3.2 To insert the klystron repeat the same steps in opposite order. Do not over tighten the klystron retainer nut.
- 4.3.3.3 After a change of klystron the repeller tracking should be checked. Do not attempt to correct the repeller voltage tracking without complete equipment as shown in Section 4.2.2.

Schem. Ref. No.	Description	Mil.Spec.	Mfgr.	Type Number
C101	Capacitor, Fixed, Paper, .25 MF-400V	MIL-C-25		CP91BIEE254M
C102	Capacitor, Fixed, Paper, 4 MF-600V	N MIL-C-25		CP70BIEF405M
C103	Capacitor, Fixed Mica 150 MMF-300V	MIL-C-5		CM15C151J
C104	Capacitor, Fixed, Electrolytic 2000 MF-15V	MIL-C-62A		CE41C202E
C105	Capacitor, Fixed, Mica 4700 MMF-300V	MIL-C-5		CM35B472K
C106	Capacitor, Fixed, Paper 4MF-600V	N MIL-C-25		CP70BIEF405M
C107	Capacitor, Fixed, Paper 4 MF-600V	N MIL-C-25		CP70BIEF405M
C108	Capacitor, Fixed, Paper 1MF-400V	MIL-C-25		CP91BIEE105M
C109	Capacitor, Fixed, Paper 0.1 MF-400V	MIL-C-25		CP91BIEE104M
C110	Capacitor, Fixed, Paper 4 MF-600V	N MIL-C-25		CP70BIEF405M
C201	Capacitor, Fixed, Paper .01MF-600V	N MIL-C-25		CP28AIEF103M
C202	Capacitor, Fixed, Paper 1MF-400V	MIL-C-25		CP91BIEE105M
C203	Capacitor, Fixed, Paper .01 MF-600V	N MIL-C-25		CP28AIEF103M
C204	Capacitor, Fixed, Paper .047MF-400V	MIL-C-25		CP08AIEE473M
C205	Capacitor, Fixed, Paper .01MF-600V	N MIL-C-25		CP28AIEF103M
C206	Capacitor, Fixed, Paper .25MF-400V	MIL-C-25		CP91BIEE254M
C207	Capacitor, Fixed, Mica, 68 MMF-300V 5%	MIL-C-5		CM15C680J
C208	Capacitor, Fixed, Mica, 68 MMF-300V 5%	MIL-C-5		CM15C680J
C209	Capacitor, Fixed, Paper .01 MF-600V	N MIL-C-25		CP28AIEF103M
C210	Capacitor, Fixed, Paper .5MF-600V	N MIL-C-25		CP29AIEF504M
C301	Capacitor, Fixed, Paper, .25MF-400V	MIL-C-25		CP91BIEE254M
CR101	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR101A	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR102	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR103	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR104	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR105	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR106	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR107	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR108	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR109	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR110	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR111	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR112	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR113	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR114	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR115	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR116	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR116A	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR116B	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR116C	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR117	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR118	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR119	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540
CR120	Diode, Silicon, 400V PIV- 750 MA	MIL-E-1		IN540

Schem. Ref. No.	Description	Mil. Spec.	Mfgr.	Type No.
CR121	Diode, Silicon, Zener Voltage 6.5V $\pm$ 5%, 10W	Commercial	Transitron	SV-2008
CR301	Diode, Silicon, 400V PIV - 750 MA	MIL-E-1		IN 540
CR302	Diode, Silicon, 400V PIV - 750 MA	MIL-E-1		IN540
CR303	Diode, Silicon, 400V PIV - 750 MA	MIL-E-1		IN540
F101	Fuse, 3 amp, Slow Blowing	MIL-F-15160		
F301	Fuse, 1/32 amp, Slow Blowing	MIL-F-15160		
I101	Lamp, 6.3V - .15A, T 3-1/4 Bulb, Bayonet Base	MIL-L-3661		
J1	Connector, Coaxial, Type N, UG-1095 A/U	MIL-C-71		
J2	Connector, Coaxial, Type N, UG-30 C/U	MIL-C-71	Transitron	
J3	Connector, Coaxial, Type BNC, UG-90/U	MIL-C-3608		
L101	Reactor 8H-200 MA, Per Sierra Spec. SS-11372-1	MIL-T-27A	Paeco #1627	TF4RX04YY
M301	Meter, 100-0-100 μ ADC 2-1/2" Round	MIL-M-10384		MR26WIHID-CUAR
R101	Resistor, Fixed, Composition, 220 Ω 2W 10%	MIL-R-11C		RC42GF221K
R102	Resistor, Fixed, Wire Wound 10 Ω 26W	MIL-R-26C		RW33V100
R103	Resistor, Fixed, Wire Wound 31K 55W	MIL-R-26C		RW35V313
R104	Resistor, Fixed, Composition, 1K 1W 10%	MIL-R-11C		RC32GF102K
R105	Resistor, Fixed, Composition, 120K 1/2W 10%	MIL-R-11C		RC20GF124K
R106	Resistor, Fixed, Composition, 470K 1/2W 10%	MIL-R-11C		RC20GF474K
R107	Resistor, Fixed, Composition, 330K 1/2W 10%	MIL-R-11C		RC20GF334K
R108	Resistor, Fixed, Wire Wound 5K 11W	MIL-R-26C		RW29V502
R109	Resistor, Fixed, Composition, 470 Ω 1/2W 10%	MIL-R-11C		RC20GF471K
R110	Resistor, Fixed, Composition, 33 Ω 1/2W 10%	MIL-R-11C		RC20GF330K
R111	Resistor, Fixed, Composition, 33 Ω 1/2W 10%	MIL-R-11C		RC20GF330K
R112	Resistor, Fixed, Composition, 680K 1/2W 10%	MIL-R-11C		RC20GF684K
R113	Resistor, Fixed, Composition, 4.7 MEG 1/2W 10%	MIL-R-11C		RC20GF475K
R114	Resistor, Fixed, Composition, 150K 2W 10%	MIL-R-11C		RC42GF154K
R115	Resistor, Fixed, Wire Wound 1K 7W	MIL-R-26C		RW55V102
R116	Resistor, Fixed, Wire Wound 1K 7W	MIL-R-26C		RW55V102
R117	Resistor, Fixed, Composition, 15K 2W 10%	MIL-R-11C		RC42GF153K
R118	Resistor, Fixed, Composition, 15K 2W 10%	MIL-R-11C		RC42GF153K
R119	Resistor, Fixed, Composition, 15K 2W 10%	MIL-R-11C		RC42GF153K
R120	Resistor, Variable Composition, 10K 2W Linear	MIL-R-94B		RV4LAYS A103A
R121	Resistor, Fixed, Composition, 12K 2W 10%	MIL-R-11C		RC42GF123K
R122	Resistor, Fixed, Composition, 33 Ω 1/2W 10%	MIL-R-11C		RC20GF330K
R123	Resistor, Fixed, Composition, 47K 1/2W 10%	MIL-R-11C		RC20GF473K
R124	Resistor, Fixed, Composition, 120K 1/2W 10%	MIL-R-11C		RC20GF124K
R125	Resistor, Fixed, Composition, 100K 2W 10%	MIL-R-11C		RC42GF104K
R126	Resistor, Fixed, Wire Wound 15K 26W	MIL-R-26C		RW33V153
R127	Resistor, Fixed, Wire Wound 15K 26W	MIL-R-26C		RW33V153

Electrical Parts List for

FM SIGNAL GENERATOR
MODEL 201B

Schematic Diagram No. E-11800-5

Schem. Ref. No.	Description	Mil. Spec.	Mfg.	Type No.
R128	Resistor, Fixed, Composition, 47K 2W 10%	MIL-R-11C		RC42GF473K
R201	Resistor, Fixed, Composition, 1.5K 1/2W 10%	MIL-R-11C		RC20GF152K
R202	Resistor, Variable, Composition, 1K 2W Linear	MIL-R-94B		RV4NAYSD-102A
R203	Resistor, Fixed, Composition, 27K 2W 10%	MIL-R-11C		RC42GF273K
R204	Resistor, Fixed, Composition, 470Ω 1/2W 10%	MIL-R-11C		RC20GF471K
R205	Resistor, Fixed, Composition, 220K 1/2W 10%	MIL-R-11C		RC20GF224K
R206	Resistor, Fixed, Composition, 270Ω 1/2W 10%	MIL-R-11C		RC20GF271K
R207	Resistor, Fixed, Composition, 470Ω 1/2W 10%	MIL-R-11C		RC20GF471K
R208	Resistor, Fixed, Composition, 33K 2W 10%	MIL-R-11C		RC42GF333K
R209	Resistor, Fixed, Composition, 33K 1W 10%	MIL-R-11C		RC32GF333K
R210	Resistor, Fixed, Composition, 33K 2W 10%	MIL-R-11C		RC42GF333K
R211	Resistor, Fixed, Composition, 27K 1/2W 10%	MIL-R-11C		RC20GF273K
R212	Resistor, Fixed, Composition, 390Ω 1/2W 10%	MIL-R-11C		RC20GF391K
R213	Resistor, Fixed, Composition, 220K 1/2W 10%	MIL-R-11C		RC20GF224K
R214	Resistor, Fixed, Composition, 220K 2W 10%	MIL-R-11C		RC42GF224K
R215	Resistor, Variable, Composition, 50K 2W Linear	MIL-R-94B		RV4NAYSD-503A
R216	Resistor, Fixed, Composition, 47K 1/2W 10%	MIL-R-11C		RC20GF473K
R217	Resistor, Fixed, Composition, 18 MEG 1/2W 5%	MIL-R-11C		RC20GF186J
R218	Resistor, Variable, Composition, 5 MEG 2W Linear	MIL-R-94B		RV4LAYSA505A
R219	Resistor, Fixed, Composition, 1K 1W 10%	MIL-R-11C		RC32GF102K
R220	Resistor, Fixed, Film, 12.1K 2W 1%	MIL-R-11C		RN80A1212F
R221	Resistor, Fixed, Film, 12.1K 2W 1%	MIL-R-11C		RN80A1212F
R222	Resistor, Fixed, Composition, 4.7K 1/2W 10%	MIL-R-11C		RC20GF472K
R223	Resistor, Fixed, Composition, 4.7K 1/2W 10%	MIL-R-11C		RC20GF472K
R224	Resistor, Fixed, Composition, 680K 1/2W 10%	MIL-R-11C		RC20GF684K
R225	Resistor, Fixed, Composition, 20 MEG 1/2W 5%	MIL-R-11C		RC20GF206J
R226	Resistor, Fixed, Composition, 220K 1/2W 10%	MIL-R-11C		RC20GF224K
R227	Resistor, Fixed, Composition, 100Ω 1/2W 10%	MIL-R-11C		RC20GF101K
R228	Resistor, Fixed, Wire Wound 5K 11W	MIL-R-26C		RW29V502
R301	Thermistor Assembly, 4500 Ω at 25°C	Com.	Sierra	SU-11487-2
R302	Resistor, Fixed, Composition, 100Ω 2W 10%	MIL-R-11C		RC42GF101K
R303	Resistor, Fixed, Composition, 1.8K 2W 10%	MIL-R-11C		RC42GF182K
R304	Resistor, Fixed, Composition, 470Ω 2W 10%	MIL-R-11C		RC42GF471K
R305	Resistor, Fixed, Film, 100Ω 1/2W 1%	MIL-R-10509		RN70A1000F
R306	Resistor, Fixed, Film, 220Ω 1/2W 1%	MIL-R-10509		RN70A2200F
R307	Resistor, Fixed, Composition, 1.8K 2W 10%	MIL-R-11C		RC42GF182K
R308	Resistor, Variable, Composition, 250Ω 2W Linear	MIL-R-94B		RV4NAYSD251A
R309	Resistor, Fixed, Composition, 2.2K 1/2W 10%	MIL-R-11C		RC20GF222K
R310	Resistor, Fixed Wire Wound 6.3 K 55W	MIL-R-26C		RW35V632

Schem. Ref. No.	Description	Mil.Spec.	Mfr.	Type No.
R311	Resistor, Fixed, Film, 220Ω 1/2W 1%	MIL-R-10509		RN70A2200F
R312	Resistor, Variable, Composition, 5K 2W Linear	MIL-R-94B		RV4LAYSA502A
R313	Resistor, Fixed, Composition, 12K 1/2W 10%	MIL-R-11C		RC20GF123K
R314	Resistor, Fixed, Composition, 8.2K 1/2W 10%	MIL-R-11C		RC20GF822K
R315	Resistor, Variable, Composition, 25K 2W Linear	MIL-R-94B		RV4LAYSA253A
R316	Resistor, Variable, Composition, 10K 2W Linear	MIL-R-94B		RV4LAYSA103A
R317	Resistor, Variable, Composition, 100K 4W Linear	Com.	Clarostat	Ser. 10 Pot Pot
R318	Resistor, Fixed, Composition, 47Ω 1/2W 10%	MIL-R-11C		RC20GF470K
R319	Resistor, Fixed, Composition, 100K 1/2W 10%	MIL-R-11C		RC20GF104K
R320	Not Used			
R321	Resistor, Fixed, Composition, 100K 2W 10%	MIL-R-11C		RC42GF104K
R322	Resistor, Fixed, Film, 100K 1/2W 1%	MIL-R-10509		RN70A1003F
R323	Resistor, Fixed, Composition, 47K 1/2W 10%	MIL-R-11C		RC20GF473K
R324	Thermistor, Bead, 2000 OHM at 25°C	Com.	Victory Eng.	32A5
R325	Resistor, Fixed, Composition, 56Ω 1/10W 10%	Com.	Allen-Bradley	Type TR
R326	Resistor, Fixed, Composition, 2W Selected			
S1	Switch, DPDT, 5A-125V Toggle	MIL-S-3950		ST52N
S2	Switch, Rotary, 4 Pole - 4 pos., non-shorting	MIL-S-3786	Central Lab.	PA-2011M
T101	Transformer, Power, Per Sierra Spec. SS-11370-1	MIL-T-27A	Paeco #8977	TF4RX06YY
TP201	Binding Post Assembly, Type 938-WB	Com.	Gen. Radio	

Electrical Parts List for

Schematic Diagram No.

E-11800-5

Schem. Ref. No.	Description	Mil.Spec.	Mfr.	Type No.
TP301	Binding Post Assembly, Type 938-WB	Com.	Gen.Radio	
V101	Electron Tube Jan-6080WA	MIL-E-1		
V102	Electron Tube Jan-5751	MIL-E-1		
V103	Electron Tube Jan-5651WA	MIL-E-1		
V104	Electron Tube Jan-0A 2WA	MIL-E-1		
V105	Electron Tube Jan-0A 2WA	MIL-E-1		
V106	Electron Tube Jan-0B2WA	MIL-E-1		
V201	Electron Tube Jan-0A 2WA	MIL-E-1		
V202	Electron Tube Jan-12A T7WA	MIL-E-1		
V203	Electron Tube Jan-5814A	MIL-E-1		
V204	Electron Tube Jan-12A T7WA	MIL-E-1		
V301	Electron Tube Jan-6BM6	N MIL-E-1		
XF101	Fuse Holder, Extractor Post, 3A G	MIL-E-4158	Little Fuse Inc.	342003
XF301	Fuse Holder, Extractor Post, 3A G	MIL-E-4158	Little Fuse Inc.	342003
X1101	Lamp Holder	MIL-L-3661		LH62BR2
XV101	Tube Socket, Octal	JAN-S-28A 1		TS 101PO 1
XV102	Tube Socket, 9 Pin Miniature	JAN-S-28A 1		TS 103PO 1
XV103	Tube Socket, 7 Pin Miniature	JAN-S-28A 1		TS 102PO 1
XV104	Tube Socket, 7 Pin Miniature	JAN-S-28A 1		TS 102PO 1
XV105	Tube Socket, 7 Pin Miniature	JAN-S-28A 1		TS 102PO 1
XV106	Tube Socket, 7 Pin Miniature	JAN-S-28A 1		TS 102PO 1

Electrical Parts List for

Schematic Diagram No.

E-11800-5

Schem. Ref. No.	Description	Mil.Spec.	Mfr.	Type No.
XV201	Tube Socket, 7 Pin Miniature	JAN-S-28A 1		TS 102PO 1
XV202	Tube Socket , 9 Pin Miniature	JAN-S-28A 1		TS 103PO 1
XV203	Tube Socket, 9 Pin Miniature	JAN-S-28A 1		TS 103PO 1
XV204	Tube Socket , 9 Pin Miniature	JAN-S-28A 1		TS 103PO 1
XC301	Tube Socket , 4 Pin Miniature	Com.	Amphenol	78-S4S
Z1	Attenuator, Coax, 20db, 1W, Type N			

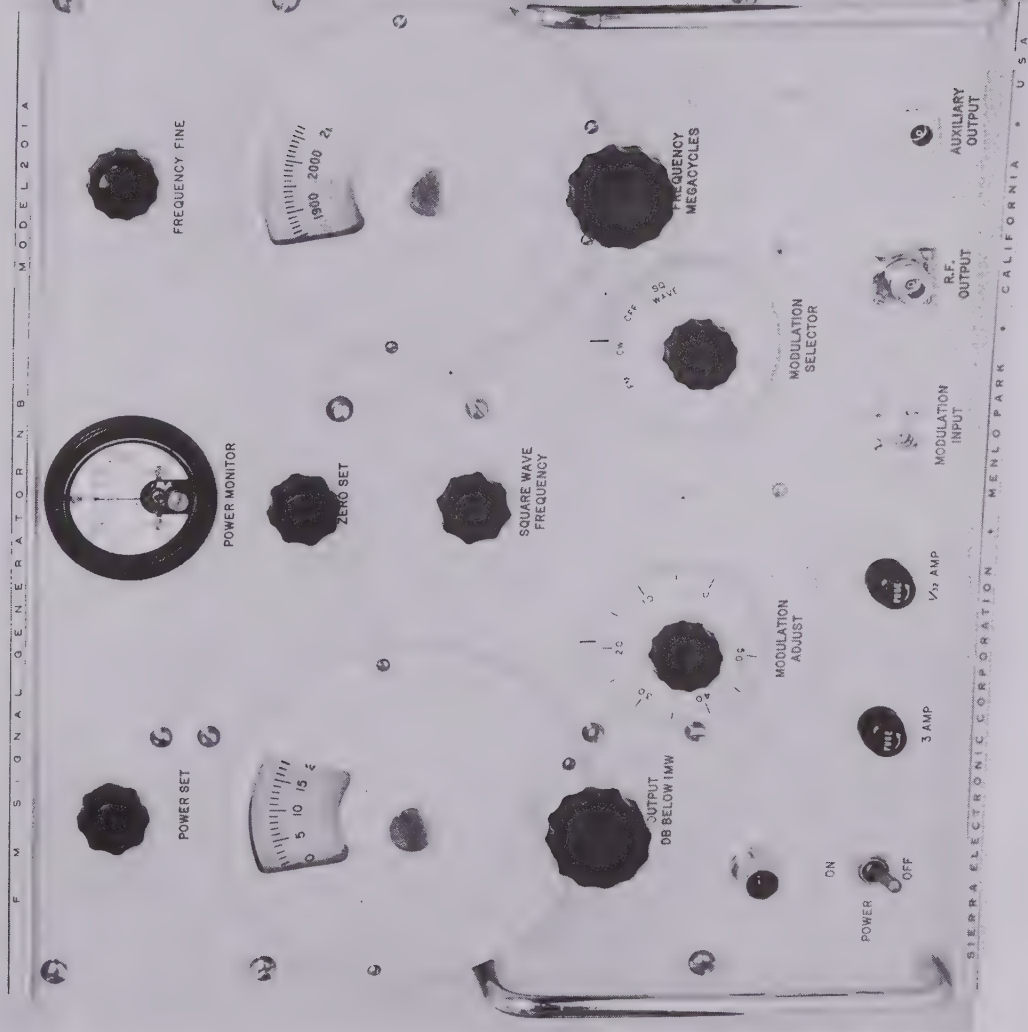


FIG. 1 FM Signal Generator, Front View



FIG. 2 Cavity, Assembled

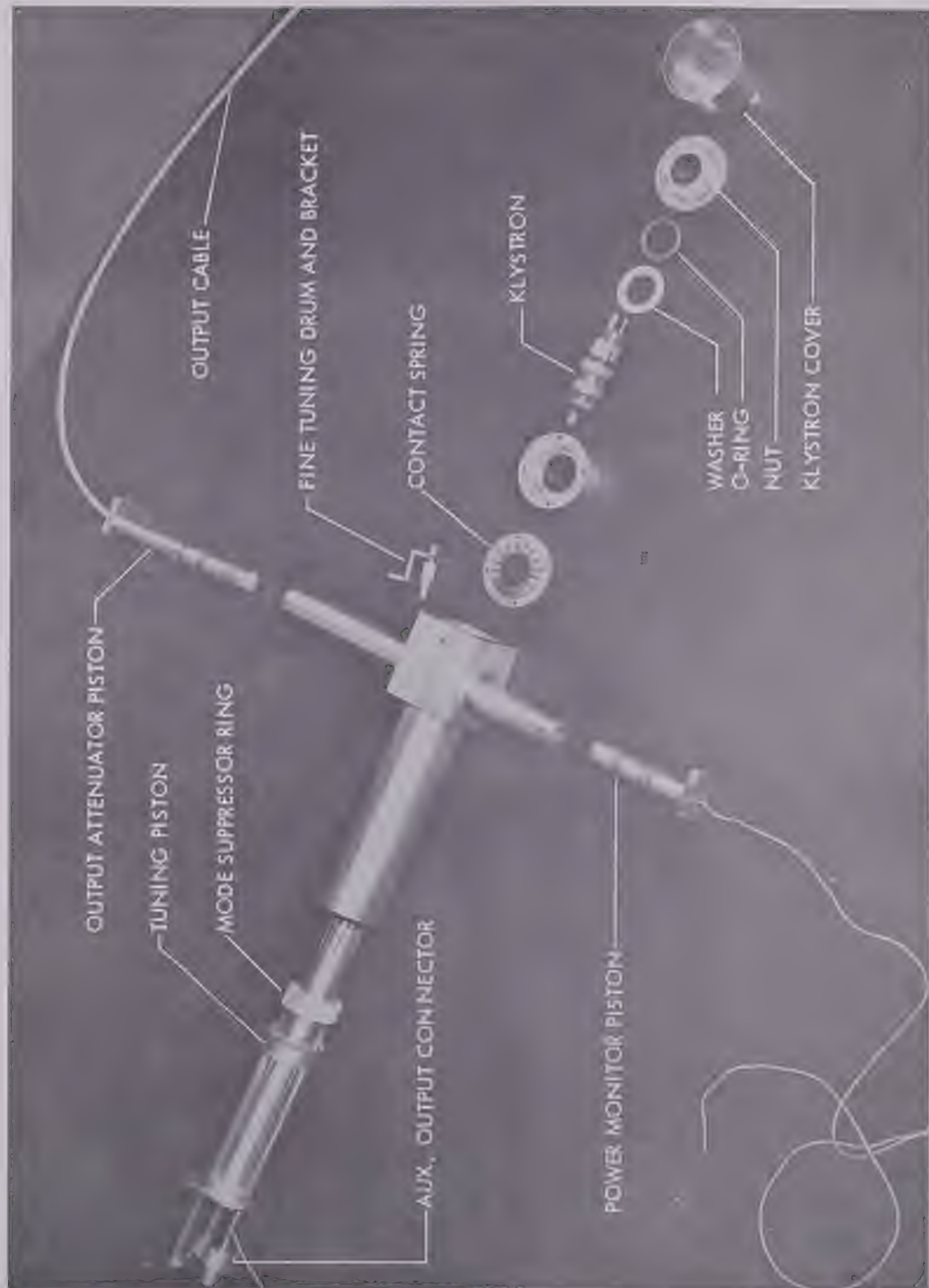


FIG. 3 Cavity, Exploded View

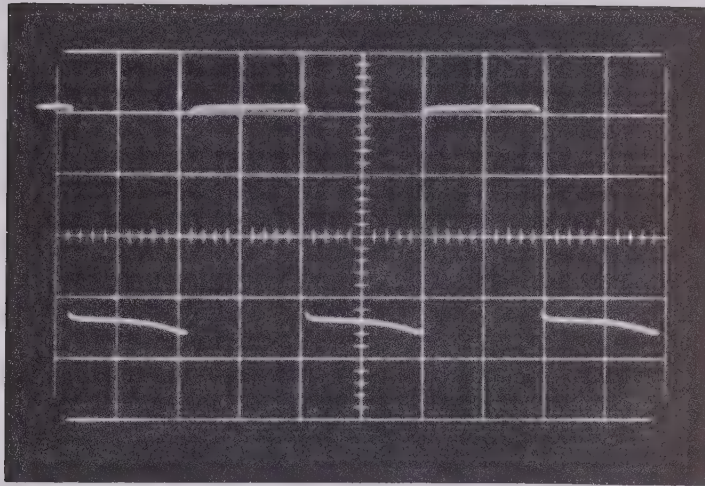


FIG. 4 Waveshape On V204, pin 3 and 8.

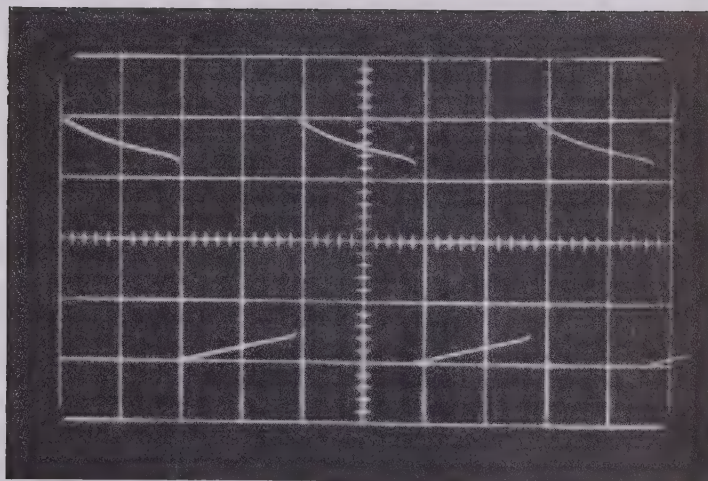


FIG. 5 Waveshape Across R305 With Modulation Selector On Off (Pos. 2)

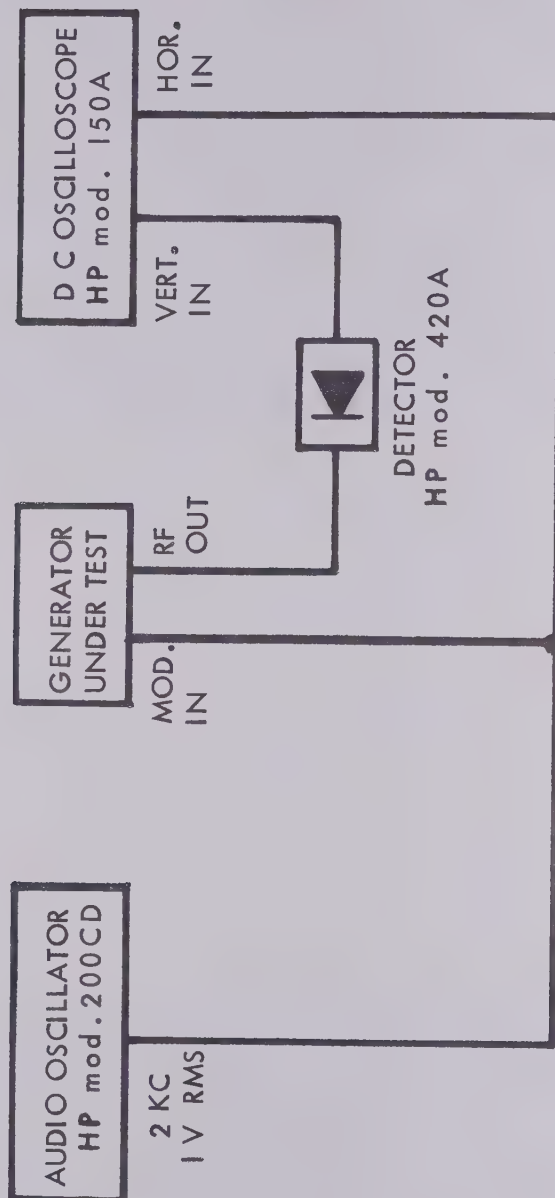


FIG. 6

SET-UP FOR ADJUSTING
REPELLER VOLTAGE

Sierra Electronic Corp

MENLO PARK, CALIFORNIA
A SUBSIDIARY OF PHILCO CORPORATION

DATE 8-12-59

SK-11801-1

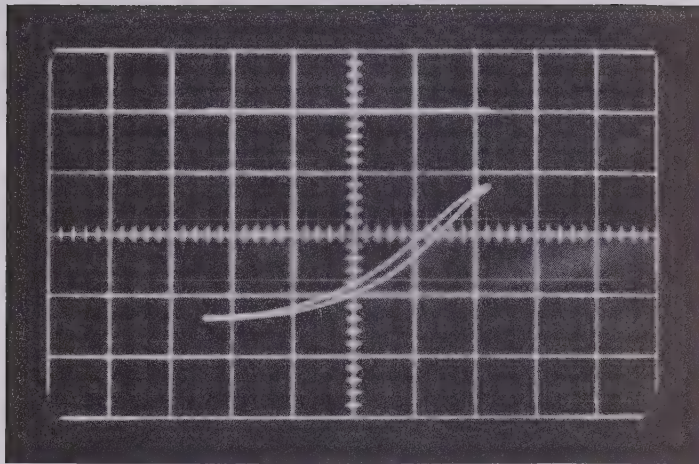


FIG. 7a Output Power vs. Modulation Voltage With Nearly Correct Repeller Voltage

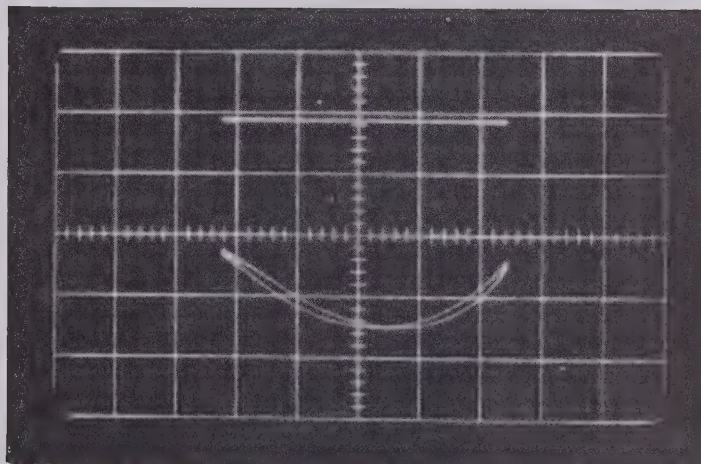


FIG. 7b Same With Correct Repeller Voltage

REFILLER VOLTAGE VS. FREQUENCY



FIG. 8

2.6 kMc

